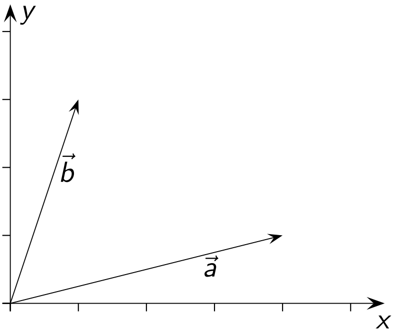
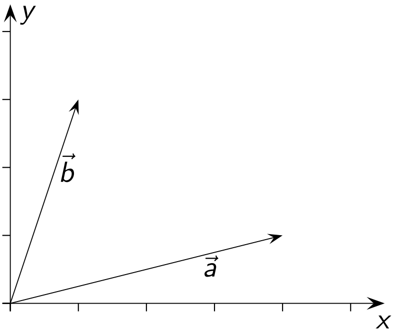
Vektoren

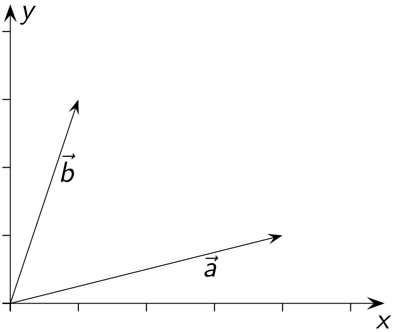
G.Roolfs



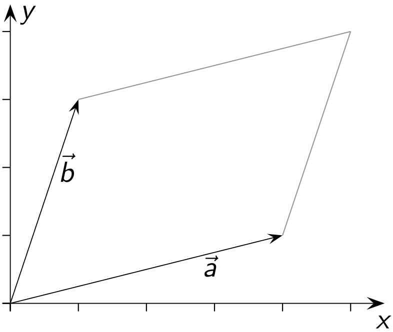
$$\vec{a} + \vec{b} = \begin{pmatrix} 4 \\ 1 \end{pmatrix} + \begin{pmatrix} 1 \\ 3 \end{pmatrix} =$$



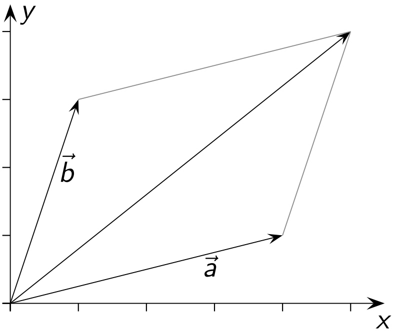
$$\vec{a} + \vec{b} = \begin{pmatrix} 4 \\ 1 \end{pmatrix} + \begin{pmatrix} 1 \\ 3 \end{pmatrix} = \begin{pmatrix} 4+1 \\ 1+3 \end{pmatrix} =$$



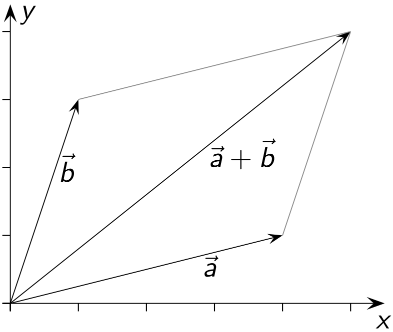
$$\vec{a}+\vec{b}=\begin{pmatrix}4\\1\end{pmatrix}+\begin{pmatrix}1\\3\end{pmatrix}=\begin{pmatrix}4+1\\1+3\end{pmatrix}=\begin{pmatrix}5\\4\end{pmatrix}$$



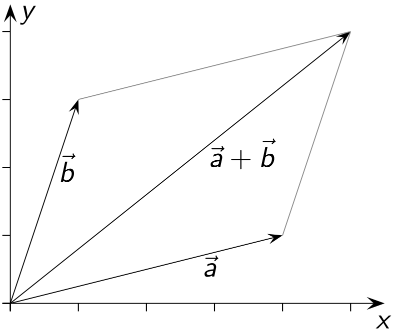
$$\vec{a} + \vec{b} = \begin{pmatrix} 4 \\ 1 \end{pmatrix} + \begin{pmatrix} 1 \\ 3 \end{pmatrix} = \begin{pmatrix} 4+1 \\ 1+3 \end{pmatrix} = \begin{pmatrix} 5 \\ 4 \end{pmatrix}$$



$$\vec{a}+\vec{b}=\begin{pmatrix}4\\1\end{pmatrix}+\begin{pmatrix}1\\3\end{pmatrix}=\begin{pmatrix}4+1\\1+3\end{pmatrix}=\begin{pmatrix}5\\4\end{pmatrix}$$

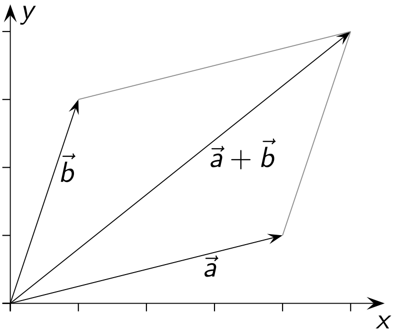


$$\vec{a}+\vec{b}=\begin{pmatrix}4\\1\end{pmatrix}+\begin{pmatrix}1\\3\end{pmatrix}=\begin{pmatrix}4+1\\1+3\end{pmatrix}=\begin{pmatrix}5\\4\end{pmatrix}$$



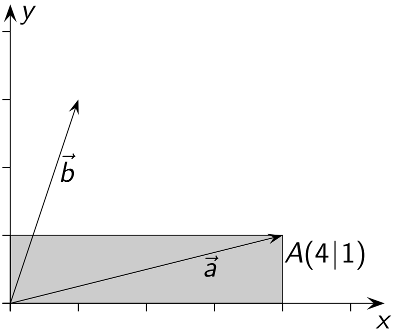
$$\vec{a}+\vec{b}=\begin{pmatrix}4\\1\end{pmatrix}+\begin{pmatrix}1\\3\end{pmatrix}=\begin{pmatrix}4+1\\1+3\end{pmatrix}=\begin{pmatrix}5\\4\end{pmatrix}$$

Bei der Addition erhalten wir die Eckpunkte eines

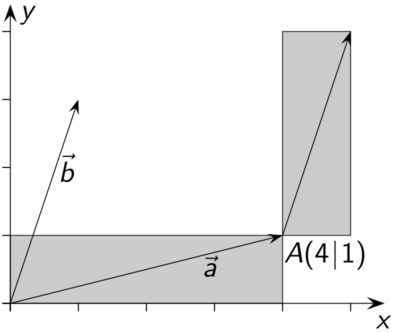


$$\vec{a}+\vec{b}=\begin{pmatrix}4\\1\end{pmatrix}+\begin{pmatrix}1\\3\end{pmatrix}=\begin{pmatrix}4+1\\1+3\end{pmatrix}=\begin{pmatrix}5\\4\end{pmatrix}$$

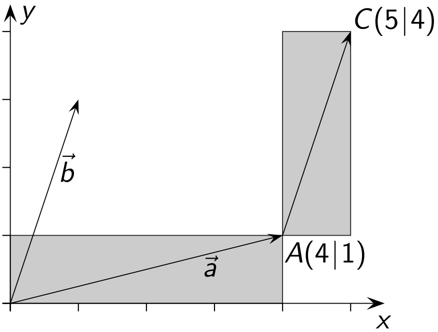
Bei der Addition erhalten wir die Eckpunkte eines Parallelogramms.



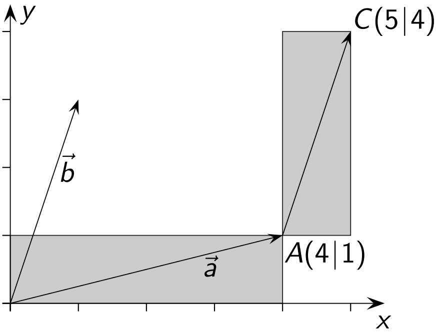
$$\vec{a} + \vec{b} = \begin{pmatrix} 4 \\ 1 \end{pmatrix} + \begin{pmatrix} 1 \\ 3 \end{pmatrix} = \begin{pmatrix} 4+1 \\ 1+3 \end{pmatrix} = \begin{pmatrix} 5 \\ 4 \end{pmatrix}$$



$$\vec{a} + \vec{b} = \begin{pmatrix} 4 \\ 1 \end{pmatrix} + \begin{pmatrix} 1 \\ 3 \end{pmatrix} = \begin{pmatrix} 4+1 \\ 1+3 \end{pmatrix} = \begin{pmatrix} 5 \\ 4 \end{pmatrix}$$

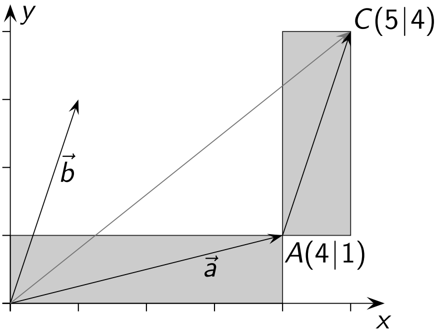


$$\vec{a}+\vec{b}=\begin{pmatrix}4\\1\end{pmatrix}+\begin{pmatrix}1\\3\end{pmatrix}=\begin{pmatrix}4+1\\1+3\end{pmatrix}=\begin{pmatrix}5\\4\end{pmatrix}$$



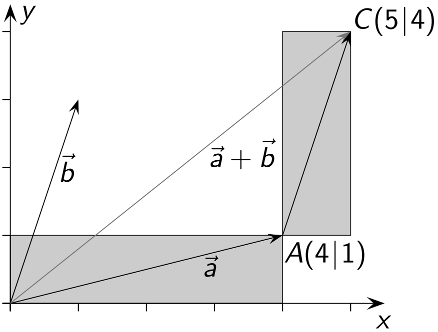
$$\vec{a} + \vec{b} = \begin{pmatrix} 4 \\ 1 \end{pmatrix} + \begin{pmatrix} 1 \\ 3 \end{pmatrix} = \begin{pmatrix} 4+1 \\ 1+3 \end{pmatrix} = \begin{pmatrix} 5 \\ 4 \end{pmatrix}$$

Der angehängte Pfeil verdeutlicht,



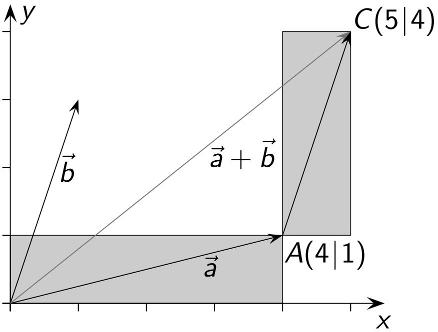
$$\vec{a} + \vec{b} = \begin{pmatrix} 4 \\ 1 \end{pmatrix} + \begin{pmatrix} 1 \\ 3 \end{pmatrix} = \begin{pmatrix} 4+1 \\ 1+3 \end{pmatrix} = \begin{pmatrix} 5 \\ 4 \end{pmatrix}$$

Der angehängte Pfeil verdeutlicht, dass bei der Addition von einem Vektor ausgegangen werden kann



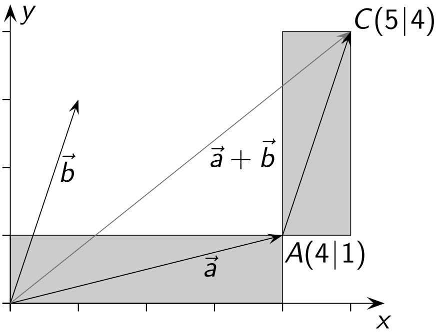
$$\vec{a}+\vec{b}=\begin{pmatrix}4\\1\end{pmatrix}+\begin{pmatrix}1\\3\end{pmatrix}=\begin{pmatrix}4+1\\1+3\end{pmatrix}=\begin{pmatrix}5\\4\end{pmatrix}$$

Der angehängte Pfeil verdeutlicht, dass bei der Addition von einem Vektor ausgegangen werden kann und der andere Vektor



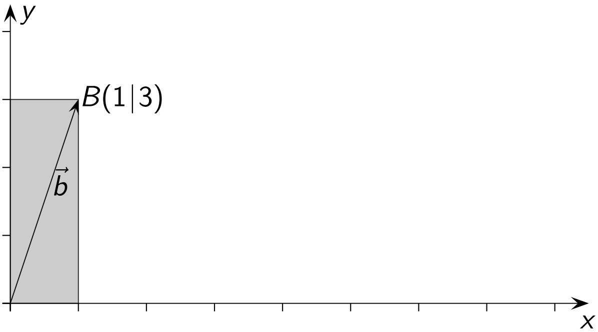
$$\vec{a} + \vec{b} = \begin{pmatrix} 4 \\ 1 \end{pmatrix} + \begin{pmatrix} 1 \\ 3 \end{pmatrix} = \begin{pmatrix} 4+1 \\ 1+3 \end{pmatrix} = \begin{pmatrix} 5 \\ 4 \end{pmatrix}$$

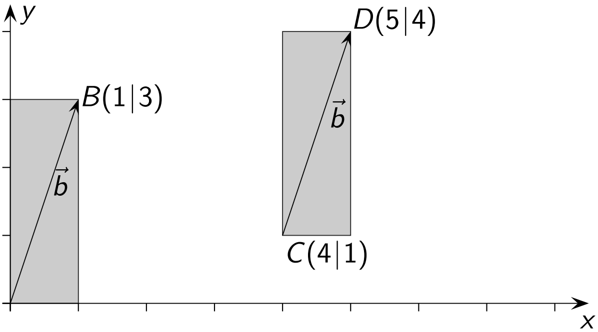
Der angehängte Pfeil verdeutlicht, dass bei der Addition von einem Vektor ausgegangen werden kann und der andere Vektor die Koordinatenänderungen angibt,

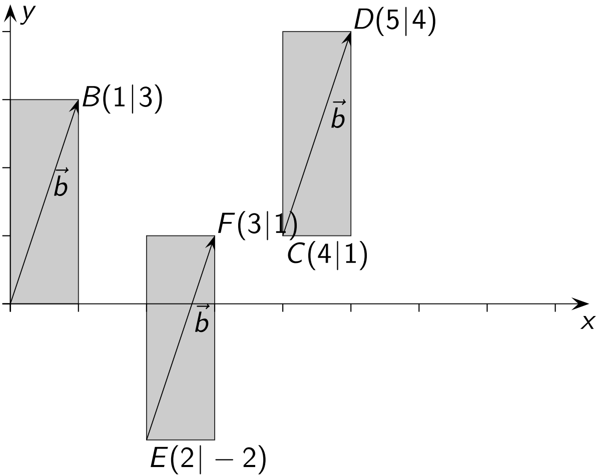


$$\vec{a}+\vec{b}=\begin{pmatrix}4\\1\end{pmatrix}+\begin{pmatrix}1\\3\end{pmatrix}=\begin{pmatrix}4+1\\1+3\end{pmatrix}=\begin{pmatrix}5\\4\end{pmatrix}$$

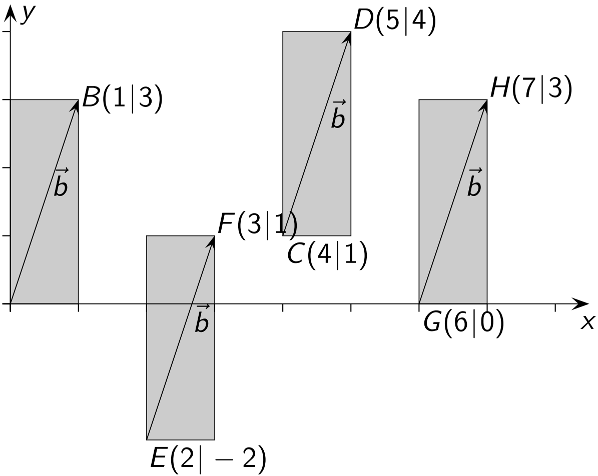
Der angehängte Pfeil verdeutlicht, dass bei der Addition von einem Vektor ausgegangen werden kann und der andere Vektor die Koordinatenänderungen angibt, um von A nach C zu gelangen.

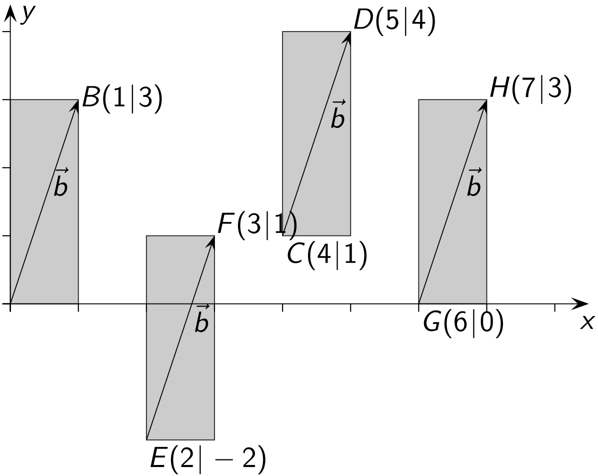

y
B(1|3)
b
x


y
x
B(1|3)
D(5|4)
C(4|1)
$\vec{b}$
$\vec{b}$

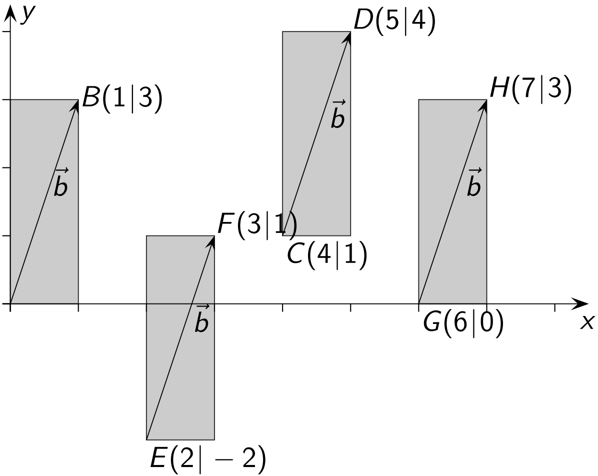


y
$D(5|4)$
$B(1|3)$
$\vec{b}$
$\vec{b}$
$F(3|1)$
$C(4|1)$
$\vec{b}$
x
$E(2|-2)$

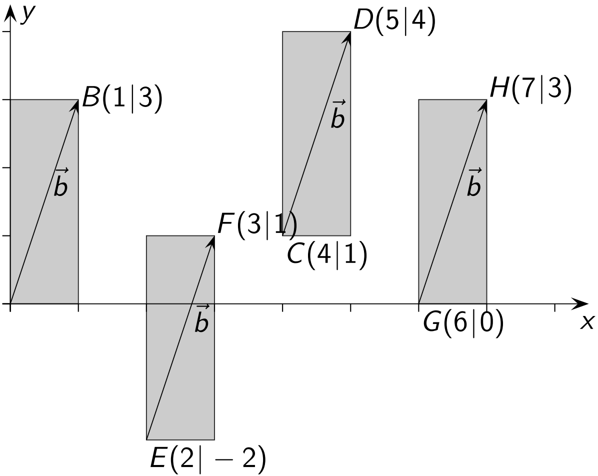

y
D(5|4)
B(1|3)
H(7|3)
b
b
b
F(3|1)
C(4|1)
b
x
G(6|0)
E(2| − 2)



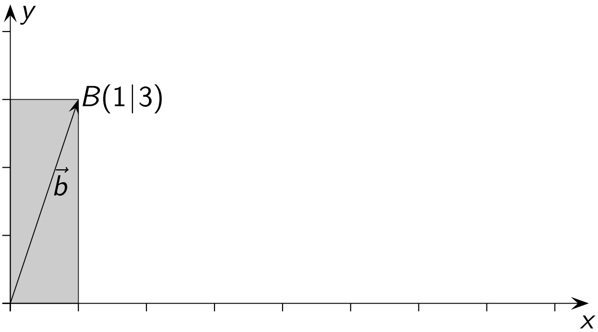
Zu $\vec{b} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$ gehört als Ortsvektor der Endpunkt



Zu $\vec{b} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$ gehört als Ortsvektor der Endpunkt $B(1|3)$.

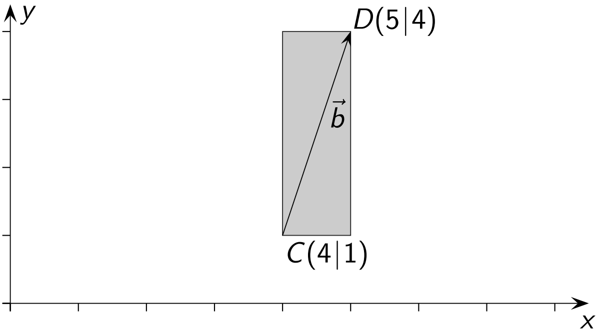


Zu $\vec{b} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$ gehört als Ortsvektor der Endpunkt $B(1|3)$.
Gleichzeitig ist mit $\vec{b}$ eine Richtung gegeben, die durch jeweils 2 Punkte festgelegt ist.



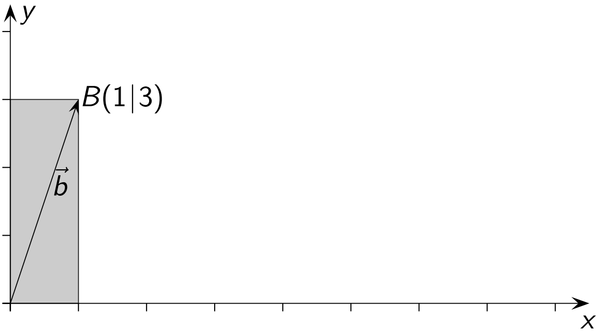
Welcher Aspekt (Punkt- oder Richtungsangabe) gemeint ist, geht aus der Anwendung hervor.

$$\vec{b} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$$



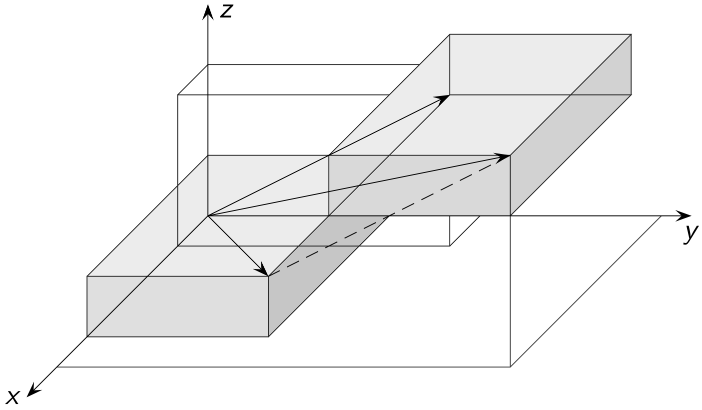
Welcher Aspekt (Punkt- oder Richtungsangabe) gemeint ist, geht aus der Anwendung hervor.

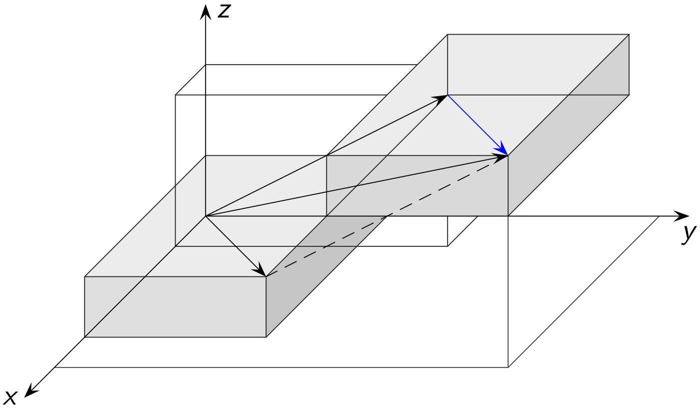
$$\vec{b} = \begin{pmatrix} 5 \\ 4 \end{pmatrix} - \begin{pmatrix} 4 \\ 1 \end{pmatrix} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$$

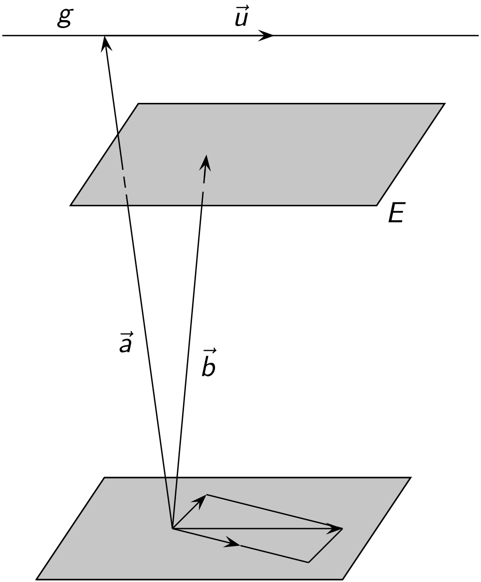


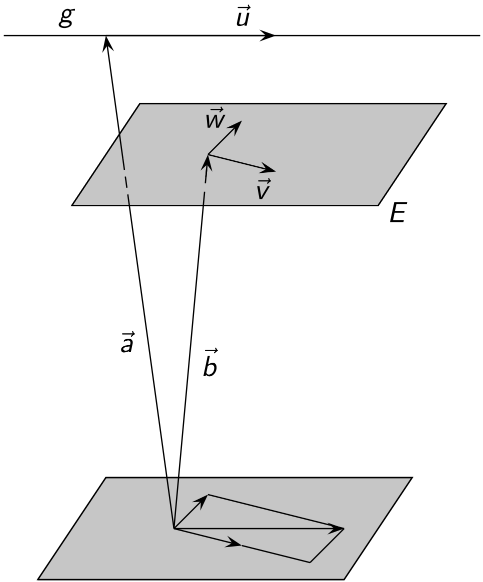
Welcher Aspekt (Punkt- oder Richtungsangabe) gemeint ist, geht aus der Anwendung hervor.

$$\vec{b} = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$$


z
y
x


z
y
x


g
$\vec{u}$
E
$\vec{a}$
$\vec{b}$



g
$\vec{u}$
$\vec{w}$
$\vec{v}$
E
$\vec{a}$
$\vec{b}$